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(54) **PRODUCING HALF-STUFFS FOR THE MANUFACTURE OF PAPERY ARTICLES**

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(57) **ABSTRACT**

The present invention relates to a process for producing half-stuffs for the manufacture of papery articles which comprises adding methanesulfonic acid to an aqueous fibrous suspension to set the pH.

PRODUCING HALF-STUFFS FOR THE MANUFACTURE OF PAPERY ARTICLES

[0001] The present invention relates to a process for producing half-stuffs which comprises setting the pH of an aqueous composition comprising at least one fibrous material by addition of methanesulfonic acid (MSA). The half-stuffs produced using the process of the present invention can be used for the manufacture of papery articles, such as paper, cardboard and paperboard for example, or for the manufacture of fiberboard (wood fiber fiberboard).

[0002] The present invention further relates to the use of methanesulfonic acid in the production of half-stuffs which can be used for the manufacture of papery articles or fiberboard.

[0003] Half-stuffs are an important starting material (fiber raw material) for the manufacture of papery articles and are generally produced in dedicated manufacturing facilities and stored, transported and traded as raw material. Half-stuffs can be provided in various forms at the paper/board machine. For storage and transportation, they are usually provided in the form of moist or dry bales or sheets. Half-stuffs can also be provided in the form of a thickened fibrous slush. The half-stuffs (or else half-finished stuffs) are then normally further processed, for example in the course of papermaking, to form what is known as whole-stuff. This involves, for example, beating, addition of wet stuff (e.g., water), dispersal and addition of fillers and/or additives (process and performance chemicals).

[0004] Increased outputs and speeds in the production of papery articles and also higher requirements for the environmental compatibility of production processes (wastewater treatment, closure of process water circuits) necessitate continual improvement in half-stuffs and/or processes for their production.

[0005] Half-stuffs are generally starting materials for the manufacture of papery articles that comprise at least one fibrous material. Half-stuffs generally comprise at least one vegetable fiber, which may generally be selected from primary fibrous material and secondary fibrous material. Primary fibrous materials are commonly recovered directly from vegetable raw materials by mechanical or chemical destructurization. Secondary fibrous materials are commonly fibrous materials which are recycled as part of the recycling involved in paper, cardboard and paperboard manufacture, e.g., wastepaper. Primary fibrous materials used include wood-free fibrous materials, more particularly chemical pulps such as sulfate pulp (SA) (also known as kraft pulp), sulfate semichemical pulp, sulfite pulp (SI) of hard- and/or softwoods. However, wood-containing fibrous materials, more particularly mechanical pulps such as groundwood (HS), pressurized groundwood (PGW), refiner mechanical pulp (RMP), thermomechanical pulp (TMP), chemical thermomechanical pulp (CTMP) and thermomechanical pulp with caustic-peroxide pretreatment (BCTMP) may also be used. Secondary fibrous materials include various wastepaper varieties and also deinked pulp (DIP). DIP is produced by a wastepaper recovery process in which a large proportion of the printing ink is removed from the fibrous suspension.

[0006] Mechanical pulp, such as groundwood, pressurized groundwood, TMP, RMP, but also chemical pulp are typically bleached. A distinction is generally made between oxidative and reductive bleaching stages, although these bleaching stages are often combined into bleaching sequences. Bleaching frequently comprises a treatment with hydrogen peroxide under alkaline conditions. When the bleaching process concludes with an alkaline stage, it is generally necessary for the fibrous suspension to be acidified.

[0007] It is further possible to use half-stuffs described above, more particularly half-stuffs comprising mechanical pulp, for the manufacture of fiberboard (wood fiber fiberboard). Papery articles for the purposes of the present invention include fiberboard (wood fiber fiberboard). Half-stuffs for the purposes of the present application are thus also wood fiber-containing starting materials for the manufacture of fiberboard. Fiberboard in the known qualities and finishes is generally produced by interfelting and pressing wood fibers with or without added binders. The wood fibers used for manufacturing wood fiber fiberboard are essentially produced by mechanical and/or chemical destructurization processes proceeding from the starting material (e.g., wood, lumber, sawmill by-products) to liberate the individual fibers, fiber fragments or fiber bundles, these destructurization processes corresponding very largely to the processes employed by the paper and pulp industry. In some instances, the wood fiber-containing starting material for the manufacture of fiberboard is subjected to a bleach.

[0008] Processes for producing the various half-stuff types comprising at least one fibrous material are described in the prior art (e.g., *Papiermacher Taschenbuch*, 8th edition, Dr. Curt Haefner-Verlag GmbH, Heidelberg), and they predominantly use wood as starting material. In addition, the use of annuals such as straw for example is also known. In general, the purpose of half-stuff or fibrous stuff production is for the grown assemblage of fiber (e.g., in wood or other raw-material plants) to be split into individual fibers and rid wholly or partly of concomitants such as lignin, hemicellulose and extractable matter.

[0009] Chemical pulp refers in general to fibrous materials recovered from vegetable fibrous raw materials (usually wood) by chemical destructurization (digestion). In the production of chemical pulp, the vegetable raw material, which is usually in the form of chopped matter (e.g., wood chips), is generally cooked in a digesting solution comprising chemical substances which react with the lignin to dissolve out the lignin and thus liberate the fibers. Chemical pulps, by way of main constituents, generally comprise cellulose alongside other materials such as hemicellulose and residual lignin. The most common forms are sulfate pulps (SA) (also called kraft pulps) which are produced, for example, by treating (cooking) the raw material (e.g., wood or straw particles) with a mixture of sodium hydroxide, sodium carbonate, sodium sulfide and/or sodium sulfate, and sulfite pulps produced, for example, by treating (cooking) the raw material with sulfite and/or bisulfite compounds, e.g., magnesium bisulfite.

[0010] Mechanical pulp generally refers to fibrous materials produced from wood in an exclusively or almost exclusively mechanical way. The term mechanical pulp comprises for example the following fibrous materials: groundwood (HS) (also stone groundwood SGW), pressurized groundwood (PGW), refiner mechanical pulp (RMP), thermomechanical pulp (TMP), chemical thermomechanical pulp (CTMP) and thermomechanical pulp with caustic/peroxide pretreatment (BCTMP).

[0011] To enhance brightness, mechanical and chemical pulps can be bleached oxidatively and/or reductively using known bleaching chemicals. Pulps are overwhelmingly

bleached oxidatively in an alkaline medium in the presence of peroxide compounds, more particularly hydrogen peroxide, in a bleaching tower for example.

[0012] Further important fibrous materials for the production of papery articles are wastepaper and deinked pulp (DIP). The wastepaper deinking process generally leads to complete or partial removal of the printing ink from the wastepaper and thus to an increase in brightness. In the deinking process, the slurried, defiberized wastepaper is commonly admixed with aqueous sodium peroxide solution, water glass, complexing agent, surfactant and hydrogen peroxide. The printing inks detach and are removed from the fibrous suspension by flotation.

[0013] The pH of an aqueous fibrous suspension is of decisive importance for the swelling of the fibers and the drainage of the fibrous suspension. A high pH leads to increased swelling of the fibers and impedes drainage of the fibrous suspension. An alkali medium, moreover, can lead to a cellulose degradation and to a yellowing of the half-stuff and/or of the papery article produced therefrom. Therefore, accurate and reliable setting of the pH in half-stuff production to the desired pH range is important. More particularly, the pH is set in the range from 4 to 11 and more particularly in the range from 4.5 to 6.8 in the case of half-stuffs used in the so-called acidic process, or in the range from 6.8 to 10.8 and preferably 7.0 to 7.5 in the case of half-stuffs used in the so-called neutral process.

[0014] The choice of suitable acids for setting the pH as part of the production of half-stuffs is very limited. Owing to the requirements of availability, price and stability, a person skilled in the art chooses from a very limited number of acids suitable for half-stuff production. The use of sulfuric acid, sodium bisulfite, sulfur dioxide (SO_2) or sulfurous acid for setting the pH in the production of half-stuffs is described in the prior art. The prior art further describes the use of carbon dioxide for pH setting of fibrous suspensions. It has also been written that the pH of a fibrous suspension can be adjusted by adding an electrolyte, such as aluminum sulfate, aluminum nitrate, polyaluminum chloride (PAC) and aluminum hydroxide chloride.

[0015] The WO 98/56988 document describes a process for stabilizing the pH of a pulp suspension for paper production using a combination of an alkali metal hydroxide and carbon dioxide.

[0016] The US 2010/0175839 document describes a multistage process for adjusting the pH of a cellulosic pulp suspension wherein the pulp is treated at least twice with carbon dioxide and at least once with a strong acid, e.g., sulfuric acid, sulfurous acid or bisulfite, and wherein a step for carbonate removal is included.

[0017] The WO 2009/003770 document discloses a process for making paper wherein a fibrous suspension comprising a mechanical pulp is subjected to an acid-base treatment to avoid reducing the brightness. In the process, the fibrous suspension is treated initially with a strong acid, more particularly sulfuric acid, sulfurous acid, hydrochloric acid and bisulfite, and then with a weak base (e.g., an alkali metal bicarbonate or alkali metal carbonate).

[0018] Sulfuric acid, sulfurous acid and sulfur dioxide have a relatively high corrosivity for the equipment and pipework (e.g. metal corrosion, concrete corrosion). In addition, there is a heightened potential hazard with using concentrated sulfuric acid, sulfurous acid and sulfur dioxide. It is further disadvantageous that the metering of gaseous additives, such as carbon dioxide or sulfur dioxide, requires costlier metering devices and that outgassing in various parts of the equipment can lead to fluctuations in the pH.

[0019] It is an object of the present invention to provide an alternative acid and/or an improved process for producing half-stuffs which meets all wastewater-relevant and environmental requirements, allows simple and inexpensive operation and has a favorable influence on the properties of the half-stuff.

[0020] We have found that, surprisingly, adding methanesulfonic acid is a particularly simple and effective way to set the pH of fibrous suspensions as part of half-stuff production.

[0021] Methanesulfonic acid has a pK_a value of −0.6 and so is a strong or very strong acid. Methanesulfonic acid is nonoxidizing and is marked by heat and hydrolysis resistance. Methanesulfonates are used in washing and cleaning compositions for example. Methanesulfonic acid is further used in acidic electroplating solutions for metal coatings.

[0022] The present application is directed to a process for producing a half-stuff for the manufacture of papery articles comprising the steps of

[0023] a) providing an aqueous composition comprising at least one fibrous material;

[0024] b) adding methanesulfonic acid to the aqueous composition comprising at least one fibrous material to set the pH;

[0025] c) optionally at least one further process step for producing a half-stuff.

[0026] The use of methanesulfonic acid in the production of half-stuffs is associated with the following advantages:

[0027] Methanesulfonic acid is readily biodegradable and is halogen-free and thus reduces the burden on wastewater treatment of the production process.

[0028] Owing to the high acid constant of methanesulfonic acid, comparatively low quantities need to be added.

[0029] Economic viability/efficiency of the production process is improved.

[0030] Methanesulfonic acid is colorless, odorless and available in high purity, hence there is no alien impact on the production system (process water, wastewater, circuit water, papery articles). Therefore, methanesulfonic acid is particularly suitable for use in the production of papery articles (packaging materials for example) which are used in the food sector.

[0031] Methanesulfonic acid has high thermal stability, a low vapor pressure, hydrolysis resistance and unlimited miscibility with water, hence handling and metering are simple.

[0032] Methanesulfonic acid is halogen-free and has minimal corrosivity compared with sulfuric acid for example.

[0033] The use of methanesulfonic acid is thus able to provide a distinct improvement in the efficiency and economics of producing half-stuffs.

[0034] It has further transpired that the dewatering behavior of aqueous fibrous suspensions can be improved by adding methanesulfonic acid. Moreover, the tendency for half-stuffs to yellow is reduced by the use of methanesulfonic acid.

[0035] Half-stuffs for the purposes of the present invention are starting materials for the manufacture of papery articles that comprise at least one fibrous material. Half-stuffs generally comprise at least one vegetable fiber, which may generally be selected from primary fibrous material and secondary

fibrous material. Primary fibrous materials are commonly recoverable directly from vegetable raw materials by mechanical or chemical destructurization. Secondary fibrous materials are commonly fibrous materials which are recycled as part of the recycling involved in paper, cardboard and paperboard manufacture, e.g., wastepaper. Primary fibrous materials used include wood-free fibrous materials, more particularly chemical pulps such as sulfate pulp (SA) (also known as kraft pulp), sulfate semi-chemical pulp, sulfite pulp (SI) of hard- and/or softwoods. However, wood-containing fibrous materials, more particularly mechanical pulps such as groundwood (HS), pressurized groundwood (PGW), refiner mechanical pulp (RMP), thermomechanical pulp (TMP), chemical thermomechanical pulp (CTMP) and thermomechanical pulp with caustic-peroxide pretreatment (BCTMP) may also be used. Secondary fibrous materials include various wastepaper varieties and also deinked pulp (DIP). DIP is produced by a wastepaper recovery process in which a large proportion of the printing ink is removed from the fibrous suspension.

[0036] Depending on the intended field of use, the half-stuff can consist essentially of one species of fibrous material or constitute a mixture of different fibrous materials and/or of differently prepared fibrous materials. For example, half-stuffs may comprise mixtures of fibrous materials differently beaten or screened in respect of fiber length.

[0037] Paper and papery article for the purposes of the present invention refer to sheetlike articles manufactured from fibers, more particularly from chemically or mechanically liberated vegetable fibers, which are formed by dewatering a fibrous suspension using at least one wire screen usually under addition of fillers and further additives. Additives are generally distinguished into process chemicals (e.g., biocides, deaerators, retention aids) and performance chemicals (e.g., dyes, optical brighteners, wet strength agents). Paper and papery articles for the purposes of the present invention are more particularly graphic papers, office communications papers, packaging papers, hygiene papers and specialty papers. Graphic papers for the purposes of the invention are all papers used for printing in flexographic printing, letterpress, offset printing or gravure printing for example, e.g., newsprint. Office communication papers are writing, printing and copying papers, for example photoprint and digital printing papers. Packaging papers are papers, cardboard and paperboard for packaging purposes, for example corrugated fiberboard. Hygiene papers for the purposes of the invention are papers of high specific volume and high absorbency, which are typically used in the sanitary or kitchen sector or in the industrial sector. The term specialty papers identifies papers and paperboards for specific technical uses, for example decor papers and filter papers.

[0038] Papery articles can be classified, according to their mass per unit area, as paper, paperboard and optionally cardboard. According to German standard specification DIN 6730, a mass per unit area of not more than 225 g/m^2 is indicative of paper and above 225 g/m^2 of paperboard. Papery articles having a mass per unit area in the range from 7 to 150 g/m^2 are often also referred to as paper, in the range from 150 to 600 g/m^2 as cardboard and from 600 g/m^2 as paperboard. Cardboard and paperboard typically consist overwhelmingly of multiple layers.

[0039] The aqueous composition more particularly is a suspension (slurry) of the fibrous material in water. The aqueous composition may comprise further dissolved, colloidally dissolved or solid constituents. The constituents in question are more particularly known to a person skilled in the art and generated or added in the course of the production of half-stuffs (including possible bleaching steps).

[0040] The process according to the present invention can be more particularly used for producing all known types of half-stuffs that are used for producing papery articles.

[0041] The fibrous material can be more particularly selected from:

- **[0042]** chemical pulps (ZS), such as sulfate pulp (SA) (also called kraft pulp), sulfate semi-chemical pulp, sulfite pulp (SI);
- **[0043]** mechanical pulps, such as groundwood (HS) (also called stone groundwood SGW), pressurized groundwood (PGW), refiner mechanical pulp (RMP), thermomechanical pulp (TMP), chemical thermomechanical pulp (CTMP), thermomechanical pulp with caustic/peroxide pretreatment (BCTMP);
- **[0044]** secondary fibrous materials, such as wastepaper (AP) and deinked pulp (DIP).

[0045] Fibrous materials used can be the above-described bleached and/or unbleached chemical pulps and/or fibrous materials from hard- or softwoods. Preference is given to using beech sulfite pulp and/or long fiber sulfate pulp.

[0046] More particularly, the aqueous composition comprises at least one fibrous material selected from the group consisting of sulfate pulp (SA), sulfate semi-chemical pulp, sulfite pulp (SI), groundwood (HS), pressurized groundwood (PGW), refiner mechanical pulp (RMP), thermomechanical pulp (TMP), chemical thermomechanical pulp (CTMP), thermomechanical pulp with caustic/peroxide pretreatment (BCTMP), wastepaper (AP) and deinked pulp (DIP).

[0047] More preferably, the aqueous composition comprises at least one fibrous material which has been alkali-oxidatively bleached.

[0048] The present invention more particularly provides a process for producing a half-stuff as described above, wherein the pH of the aqueous composition is set in step b) to a value in the range from 4 to 11, preferably in the range from 4 to 8 and preferably in the range from 6 to 7.5. When the half-stuff produced is to be used in papermaking by the so-called neutral process (usually with use of calcium carbonate as filler), the pH of the aqueous composition comprising at least one fibrous material is preferably set to a value in the range from 6.8 to 10.8 and more particularly in the range from 7.0 to 7.5. When the half-stuff produced is to be used in papermaking by the so-called acidic process, methanesulfonic acid is added to set a pH in the range from 4.5 to 6.8 in particular.

[0049] Setting the pH of the aqueous composition is more particularly effected by adding methanesulfonic acid until the desired pH value or the desired pH range is obtained. A person skilled in the art is familiar with common methods of pH control. The amount of methanesulfonic acid added depends on the type of aqueous composition comprising at least one fibrous material and its original pH and also the desired pH target value.

[0050] Setting the pH of the aqueous composition comprising at least one fibrous material can be effected by adding a mixture of acids comprising methanesulfonic acid. It is further conceivable to use a mixture of methanesulfonic acid and carbon dioxide, or a mixture of acids comprising methanesulfonic acid and carbon dioxide. More particularly, methanesulfonic acid is added as sole acid to set and/or stabilize

the pH. It is also conceivable to set/regulate the pH of the aqueous composition by additionally adding a base known to a person skilled in the art (e.g., aqueous sodium hydroxide solution).

[0051] The stock density of the aqueous composition in step a) is preferably in the range from 0.1 to 45% and preferably in the range from 3 to 45%. The aqueous composition comprising at least one fibrous material may more particularly have a stock density in the range from 3 to 8% (low consistency), in the range from 8 to 15 (middle consistency) or in the range from 15 to 45% (high consistency). When methanesulfonic acid is added at a stock density in the range from 15 to 45%, common mixing and kneading assemblies are generally used.

[0052] The stock density of an aqueous composition comprising at least one fibrous material (fibrous suspension) is the percentage of the dry mass of the filterable solids in the composition relative to the mass of the entire composition. Commonly, the dry mass is reported as absolute dry mass or as dry mass on drying under standard conditions (oven dry). The determination of the stock density of fibrous suspensions is described in DIN 54359 (EN ISO 4119) for example.

[0053] The process described in the present application for producing a half-stuff may comprise further common process steps of half-stuff production. The further processing steps can be selected according to the type of half-stuff from the process steps known to a person skilled in the art. More particularly, at least one process step can be selected from process steps for fiber liberation through chemical and/or thermal treatment of a fiber raw material (e.g., wood), dispersing, screening, beating, bleaching, drainage, pressing and drying.

[0054] The addition of methanesulfonic acid to the aqueous composition (step b) can take place at one or more different process steps of the half-stuff production process. More particularly, the present process comprises the addition of methanesulfonic acid to the aqueous composition comprising at least one fibrous material to set and/or stabilize the desired pH of the final half-stuff.

[0055] Setting the pH in the neutral or acidic pH range generally facilitates the dewatering behavior of the fibrous suspension. More particularly, step b) is followed, preferably directly, by an at least partial dewatering of the aqueous composition.

[0056] The process according to the present invention provides a half-stuff in various forms and various stock densities depending on the manner of the desired later use of the half-stuff, for example in the form of dry fibrous sheets or bales (about 90% oven dry), in the form of moist bales having stock densities (about 60% oven dry) or in the form of a thickened fibrous slush (about 5% oven dry).

[0057] In this connection, it is a preferred embodiment for step b) to be followed, preferably directly, by a dewatering of the aqueous composition to a stock density in the range from 80 to 90% (oven dry). In a further preferred embodiment, step b) is followed, preferably directly, by the dewatering of the aqueous composition to a stock density in the range from 10 to 30% (oven dry).

[0058] Preferably, step a) is preceded by at least one alkaline bleaching and/or preparation step. More particularly, step a) is preceded by at least one oxidative bleaching step by addition of at least one peroxide compound, in particular hydrogen peroxide, in the alkaline pH range

[0059] It is further preferable for step a) to be preceded by at least one deinking step of a secondary fibrous material, for example by addition of aqueous sodium hydroxide solution, water glass, complexing agent, surfactant and hydrogen peroxide.

[0060] In one embodiment, the invention relates to a process for producing a half-stuff as described above, said process comprising the steps of

[0061] a1) bleaching a fibrous material selected from the group consisting of sulfate pulp (SA), sulfate semi-chemical pulp, sulfite pulp (SI), groundwood (HS), pressurized groundwood (PGW), refiner mechanical pulp (RMP), thermomechanical pulp (TMP), chemical thermomechanical pulp (CTMP), thermomechanical pulp with caustic/peroxide pretreatment (BCTMP), wastepaper (AP) and deinked pulp (DIP) by addition of at least one peroxide compound in the alkaline pH range;

[0062] a) providing an aqueous composition comprising the bleached fibrous material from step a1;

[0063] b) adding methanesulfonic acid to the aqueous composition comprising the bleached fibrous material to set the pH.

[0064] In a further embodiment, the invention relates to a process for producing a half-stuff as described above, said process comprising the steps of

[0065] a1) deinking a secondary fibrous material, more particularly wastepaper, by addition of aqueous sodium hydroxide solution, water glass, complexing agent, surfactant and hydrogen peroxide;

[0066] a) providing an aqueous composition comprising the secondary fibrous material from step a1;

[0067] b) adding methanesulfonic acid to the aqueous composition comprising the secondary fibrous material to set the pH.

[0068] The present invention further provides for the use of methanesulfonic acid in the production of half-stuffs for the manufacture of papery articles, for example paper, paperboard, cardboard and/or fiberboard. More particularly, the papery article is selected from graphic paper, office communication paper, packaging paper, cardboard, paperboard, hygiene paper and specialty paper, preferably graphic paper and office communication paper. In a preferred embodiment, the invention provides for the use of methanesulfonic acid in the production of half-stuffs for the manufacture of papery articles wherein the papery article is a packaging material for the food sector.

[0069] More particularly, the use the present invention provides for methanesulfonic acid comprises setting the pH of an aqueous composition comprising at least one fibrous material in the production of half-stuffs.

[0070] The use of methanesulfonic acid preferably relates to the production of a half-stuff comprising at least one fibrous material selected from the group consisting of sulfate pulp (SA), sulfate semi-chemical pulp, sulfite pulp (SI), groundwood (HS), pressurized groundwood (PGW), refiner mechanical pulp (RMP), thermomechanical pulp (TMP), chemical thermomechanical pulp (CTMP), thermomechanical pulp with caustic/peroxide pretreatment (BCTMP), wastepaper (AP) and deinked pulp (DIP).

1-11. (canceled)

12. A process for producing a half-stuff for the manufacture of papery articles comprising the steps of:

a) providing an aqueous composition comprising at least one fibrous material;

b) adding methanesulfonic acid to the aqueous composition comprising at least one fibrous material to set the pH; and

c) optionally at least one further process step for producing a half-stuff

13. The process according to claim **12**, wherein the aqueous composition comprises at least one fibrous material selected from the group consisting of sulfate pulp (SA), sulfate semi-chemical pulp, sulfite pulp (SI), groundwood (HS), pressurized groundwood (PGW), refiner mechanical pulp (RMP), thermomechanical pulp (TMP), chemical thermomechanical pulp (CTMP), thermomechanical pulp with caustic/peroxide pretreatment (BCTMP), wastepaper (AP) and deinked pulp (DIP).

14. The process according to claim **12**, wherein the aqueous composition comprises at least one fibrous material which has been alkali-oxidatively bleached.

15. The process according to claim **12**, wherein the pH of the aqueous composition is set in step b) to a value in the range from 4 to 11.

16. The process according to claim **12**, wherein the aqueous composition in step a) has a stock density in the range from 0.1 to 45%.

17. The process according to claim **12**, wherein step b) is followed by an at least partial dewatering of the aqueous composition.

18. The process according to claim **12**, wherein step b) is followed by a dewatering of the aqueous composition to a stock density in the range from 80 to 90% (oven dry).

19. The process according to claim **12**, wherein step b) is followed by a dewatering of the aqueous composition to a stock density in the range from 10 to 30% (oven dry).

20. The process according to claim **12**, wherein step a) is preceded by at least one alkaline bleaching and/or preparation step.

21. The process according to claim **12**, wherein step a) is preceded by at least one oxidative bleaching step by addition of at least one peroxide compound in the alkaline pH range.

22. The process according to claim **12**, wherein step a) is preceded by at least one deinking step of a secondary fibrous material.

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